IV. CLAIMS

What is claimed is:

1. A composition comprising a molecule that inhibits nuclear envelope breakdown.
2. The composition of claim 1, wherein the molecule is not nocodozole, p50/dynamitin, or p62.
3. The composition of claim 1, wherein the molecule does not arrest cell cycle prior to nuclear envelope breakdown.
4. The composition of claim 1, wherein inhibition is measured by percent protection.
5. The composition of claim 1, wherein the composition interferes with a Nup153-COPI interaction.
6. The composition of claim 1 wherein the composition binds the zinc finger region of Nup153.
7. The composition of claim 1 wherein the composition binds the zinc finger region of Nup358/RanBP2.
8. The composition of claim 1 wherein the composition binds the zinc finger region of Npl4.
9. The composition of claim 1 wherein the composition binds the N-terminal region of Nup153.
10. The composition of claim 1 wherein the composition binds the C-terminal region of Nup153.
11. The composition of claim 1, wherein the composition binds a peptide, wherein the peptide comprises a sequence having at least 47% identity to amino acids 658 to 891 of SEQ ID NO: 2.
12. The composition of claim 1, wherein the composition binds a peptide, wherein the peptide comprises a sequence having at least 47% identity to amino acids 1353 to 1811 of SEQ ID NO: 8 or amino acids 583 to 608 of SEQ ID NO: 10.

13. The composition of claim 1, wherein the composition binds a peptide, wherein the peptide comprises a sequence set forth in 12, 14, 16, 18, 20, 22, 24, and 26.

14. The composition of claim 1, wherein the molecule is an antibody.

15. The composition of claim 14, wherein the antibody comprises an antibody that binds the N terminal region of Nup153.

16. The composition of claim 14, wherein the antibody comprises an antibody that binds the zinc finger region of Nup153.

17. The composition of claim 14, wherein the antibody comprises an antibody that binds the C terminal region of Nup153.

18. The composition of claim 14, wherein the antibody comprises an antibody that binds Nup358/RanBp2.

19. The composition of claim 14, wherein the antibody comprises an antibody that binds Npl4.

20. The composition of claim 14, wherein the antibody comprises an antibody that binds a peptide, wherein the peptide comprises a sequence having at least 47% identity to amino acids 658 to 891 of SEQ ID NO: 2.

21. The composition of claim 14, wherein the antibody comprises an antibody that binds a peptide, wherein the peptide comprises a sequence having at least 47% identity to amino acids 1353 to 1811 of SEQ ID NO: 8 or amino acids 583 to 608 of SEQ ID NO: 10.

22. The composition of claim 1, wherein the composition binds a peptide, wherein the peptide interacts with a peptide comprising a sequence set forth in SEQ ID NOS: 12, 14, 16, 18, 20, 22, 24, and 26.

23. The composition of claim 14, wherein the antibody is a polyclonal antibody.

24. The composition of claim 1, wherein the molecule comprises a peptide such as a protein variant, a chimeric protein or a related derivative.

25. The composition of claim 1, wherein the molecule is a small molecule.

26. The composition of claim 25, wherein the small molecule comprises Brefeldin A.

27. The composition of claim 1, wherein the molecule is an aptamer.

28. A method of identifying a compound that inhibits nuclear envelope breakdown, comprising adding the compound to a system wherein the system comprises Nup153 and COPI, wherein Nup153 and COPI can form a complex, and assaying for a molecule that decreases the amount of complex formed compared to the amount of complex formed in the absence of the compound

29. The method of claim 28, wherein an egg extract system is used as the method of identifying a compound.

30. The method of claim 28, wherein Nup153 and COPI are human-derived.

31. The method of claim 28, wherein a FRET system is used as the method of identifying a compound.

32. The method of claim 28, wherein inhibition is monitored by percent protection.

33. A method of identifying a compound that modulates nuclear envelope breakdown, comprising adding the compound to a system wherein the system comprises Nup153, and assaying for a molecule that interacts with Nup153

34. A method of identifying and producing a compound, the method comprising bringing into contact a test compound and Nup153;

assessing the activity of Nup153;
comparing the activity of Nup153 when exposed to the test compound to activity of Nup153 in the absence of the test compound;
wherein inhibition of Nup153 when exposed to the test compound identifies the test compound;
and producing the identified test compound.

35. The method of claim 34, wherein the inhibition is detected by gene array technology.

36. A method of identifying and producing an inhibitor of a COPI and Nup153 interaction, the method comprising bringing into contact a test compound, COPI, and Nup153;

assessing the interaction of Nup153 and COPI;
comparing the interaction of Nup153 and COPI when exposed to the test compound to the interaction of Nup153 and COPI in the absence of the test compound;
wherein a reduction in the interaction of Nup153 and COPI when exposed to the test compound identifies the inhibitor;
and producing the identified inhibitor.

37. A method of identifying and producing a compound, the method comprising bringing into contact a test compound, a ligand of Nup153, and Nup153;

assessing the interaction of Nup153 and its ligand;
comparing the interaction of Nup153 and its ligand when exposed to the test compound to activity of Nup153 and its ligand in the absence of the test compound;
wherein lack of interaction of Nup153 and its ligand when exposed to the test compound identifies the test compound;
and producing the identified test compound.

38. The method of claim 36 or 37, wherein the interaction is detected by gene array technology.

39. A method of identifying a compound that modulates nuclear envelope breakdown, comprising adding the compound to a system wherein the system comprises Nup358/RanBP2, and assaying for a molecule that interacts with Nup358/RanBP2.

40. A method of identifying and producing a compound, the method comprising bringing into contact a test compound and Nup358/RanBP2;

assessing the activity of Nup358/RanBP2;
comparing the activity of Nup358/RanBP2 3 when exposed to the test compound to activity of Nup153 in the absence of the test compound;

wherein inhibition of Nup153 when exposed to the test compound identifies the test compound;

and producing the identified test compound.

41. The method of claim 40, wherein the inhibition is detected by proteomic technology such as high throughput screening of protein interactions or activities.

42. A method of identifying and producing a compound, the method comprising bringing into contact a test compound, a ligand of Nup358/RanBP2, and Nup358/RanBP2;

assessing the interaction of Nup358/RanBP2 and its ligand;

comparing the interaction of Nup358/RanBP2 and its ligand when exposed to the test compound to activity of Nup358/RanBP2 and its ligand in the absence of the test compound;

wherein lack of interaction of Nup358/RanBP2 and its ligand when exposed to the test compound identifies the test compound;

and producing the identified test compound.

43. The method of claim 40 or 42, wherein the interaction is detected by gene array technology.

44. A method of identifying a test compound associated with nuclear envelope breakdown inhibition, comprising:

bringing into contact a test compound and a cell; and

identifying inhibition of nuclear envelope breakdown.

45. The method of claim 44, further comprising the step of

using the test compound associated with nuclear envelope inhibition to identify mechanisms of nuclear envelope breakdown.

46. A method of producing an antibody comprising, administering a region of Nup153 to an animal.

47. The method of claim 46, wherein the region of Nup153 comprises amino acids 658 to 891 of SEQ ID NO: 2 or a fragment thereof.

48. The method of claim 46, wherein the animal is a mammal.

49. A method of using the antibody of claim 46, the method comprising administering the antibody to an animal.
50. A method of inhibiting a cell cycle of a cell comprising administering a Nup153 inhibitor to the cell.
51. A method of identifying proteins that interact with Nup153 comprising operably linking Nup153 or a fragment of Nup153 to a DNA binding domain forming a first nucleic acid, transfecting a cell with the first nucleic acid, wherein the cell comprises a protein or protein fragment which is operably linked to an transcription activation domain, wherein the cell comprises a reporter system specific for the DNA binding domain, assaying the amount of expression from the reporter system, wherein an increase in expression indicates an interaction between the Nup153 or Nup153 fragment and the protein or protein fragment.
52. A system for assaying nuclear breakdown comprising Nup153, further comprising COPI, and further comprising a molecule from a Xenopus laevis egg extract.
53. A system for assaying nuclear breakdown comprising Nup153, further comprising COPI, and further comprising a Xenopus laevis egg extract.
54. The system of claim 53, wherein the system is a cell free system.
55. The system of claim 53, wherein the system comprises chromatin.
56. The system of claim 55, wherein the chromatin is sperm chromatin.
57. A method of evaluating expression of Nup153, comprising

contacting cells undergoing mitosis with a probe for Nup153;
detecting expression of Nup153.

58. The method of claim 57, wherein a micro array is used to detect expression.
59. A method of inhibiting nuclear envelope breakdown, comprising contacting a cell with the compound from claim 1.
60. The method of claim 59, wherein the activity of Nup153 is inhibited.
61. The method of claim 59, wherein the interaction of Nup153 and COPI is inhibited.

62. A method of treating a subject with cancer, comprising administering to the subject an effective amount of a compound that inhibits nuclear envelope breakdown.

63. The method of claim 62, wherein the cancer is selected from the group consisting of lymphoma, leukemia, mycosis fungoide, carcinoma, adenocarcinoma, sarcoma, glioma, blastoma, neuroblastoma, plasmacytoma, histiocytoma, melanoma, adenoma, hypoxic tumour, myeloma, AIDS-related lymphoma or AIDS-related sarcoma, metastatic cancer, bladder cancer, brain cancer, nervous system cancer, glioblastoma, ovarian cancer, skin cancer, liver cancer, squamous cell carcinomas of the mouth, throat, larynx, and lung, colon cancer, cervical cancer, breast cancer, epithelial cancer, renal cancer, genitourinary cancer, pulmonary cancer, esophageal carcinoma, head and neck carcinoma, hematopoietic cancer, testicular cancer, colo-rectal cancer, prostatic cancer, and pancreatic cancer.